which they were hatched out were collected in the first instance by the Board and forwarded to the National Fish-Culture Association to incubate, which was done most successfully. The Severn Fishery Board are to be commended upon the action they have taken to replenish their river with fish, as they set an example to other bodies having the interests of their waters at heart. The hatchery at South Kensington and Delaford belonging to the Association might become an extensive medium in carrying such an object into effect at a minimum cost.

THE additions to the Zoological Society's Gardens during the past week include a Nisnas Monkey (*Cercopithecus pyrrhonotus*) from Nubia, presented by the Rev. W. MacGregor; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. J. Coston; a Common Badger (*Meles taxus*), British, presented by Mr. C. A. Ross; six Black-footed Penguins (*Spheniscus demersus*) from South Africa, presented by Capt. John Hewat; four Siamese Blue Pies (*Urocissa magnirostris*) from Siam, two Small Hill-Mynahs (*Gracula religiosa*) from Southern India, a Rufous necked Weaver Bird (*Hyphantornis textor*) from South Africa, presented by Mr. J. M. Cook, F.Z.S.; a Golden Eagle (*Aquila chrysaetos*) from Russia, presented by Mr. Walter Holdsworth; six Long-eared Owls (*Asio otus*), British, presented by Mr. G. B. Burnand; a Malbrouck Monkey (*Cercopithecus cynosurus*) from West Africa, three Ruffs (*Machetes pugnax*), British, deposited; a Glaucous Macaw (*Ara glauca*) from Paraguay, four Crested Pigeons (*Ocyphaps lophotes*) from Australia, four Amherst's Pheasants (*Thaumalea amherstiæ*) from China, two Great American Egrets (*Ardea egretta*) from South America, two Lapwings (*Vanellus vulgaris*), British, four Indian Tree Ducks (*Dendrocygna arcuata*) from India, purchased; a Japanese Deer (*Cervus sika*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

COMET BROOKS II.—The following ephemeris for this comet is by Prof. C. Frisby (Science Observer Special Circular, No. 67):—

For Greenwich Midnight

1886	R.A. h. m. s.	Decl. ° ′	Log *r*	Log Δ	Brightness
June 11	6 23 20	69 15·0 N.	0·0380	0·1783	0·26
15	6 58 55	66 54·1	0·0557	0·2015	0·21
19	7 27 41	64 28·3	0·0734	0·2275	0·17
23	7 39 51	62 58·9	0·0909	0·2486	0·14
27	7 59 57	60 49·5 N.	0·1081	0·2704	0·12

The brightness on May 2 is taken as unity.

COMET BROOKS III.—Dr. S. Oppenheim has calculated the following elements and ephemeris for this comet from observations made on May 25, 28, and 30, at Arcetri, Rome, and Vienna:—

T = 1886 June 2·90285 Berlin M.T.

ω = 173° 57′ 49″·6
Ω = 47 14 43·5 } Mean Eq. 1886·0.
i = 16 8 52·3

log q = 0·170230

Ephemeris for Berlin Midnight

1885	R.A. h. m. s.	Decl. ° ′	Log *r*	Log Δ	Brightness
June 8	12 18 3	1 1·8 S.	0·1709	9·9183	0·87
12	12 26 1	3 32·8	0·1721	9·9274	0·83
16	12 34 25	6 1·6	0·1739	9·9375	0·79
20	12 43 15	8 27·4	0·1763	9·9486	0·75
24	12 52 27	10 49·2	0·1793	9·9605	0·70
28	13 1 59	13 6·1 S.	0·1828	9·9732	0·65

The brightness on May 25 is taken as unity.

The comet is faint, and not bright as stated in the telegram announcing the discovery.

SPECTROSCOPIC DETERMINATION OF THE MOTION OF THE SOLAR SYSTEM IN SPACE.—Dr. R. von Kövesligethy mentions (*Astronomische Nachrichten*, No. 2731) that some three years ago he tried to deduce the speed with which the sun is travelling in space and the point to which its progress is directed, from the observations of the displacements of lines in stellar spectra published in the *Monthly Notices*. The latter inquiry he gave up, as the data supplied did not seem sufficiently trustworthy for a satisfactory result to be obtained from them. He therefore assumed the apex as found from the discussion of the proper motions of stars, viz. R.A. = 216°·0, Decl. = 35°·1 N. Taking the simple arithmetical mean of the observations of the individual stars observed—about 70 in number—he found the speed of translation of the solar system to be about 8·6 geographical miles per second. This rate of motion would agree far better with Struve's value, derived from the consideration of the proper motions of stars, than Herr Homann's (NATURE, vol. xxxiii. p. 450) result does. Dr. Kövesligethy does not, however, place much reliance on the result he has thus obtained.

PUBLICATION OF THE ZONE-OBSERVATIONS OF THE "ASTRONOMISCHE GESELLSCHAFT."—M. Doubiago, who has succeeded the late Marian Kowalski as Director of the Kasan Observatory, has recently issued a volume containing the observations made at Kasan during the years 1869–77, of the stars situated in the zone between 75° and 80° of north declination. The principal object of this work, undertaken by M. Kowalski by arrangement with the *Astronomische Gesellschaft*, was the determination of the positions of the stars contained in this zone down to the ninth magnitude. M. Kowalski, however, determined to include in his work all the stars of the *Bonner Durchmusterung* situated in the above-mentioned zone, about 5000 in number, as well as a considerable number of fainter stars. The observations, commenced in 1869, were finished in 1879, and the present volume contains 14,329 observations, that is, about half the total number necessary to complete the projected scheme of having four observations of each star. The results are given in the usual form in which zone-observations are published, viz. the apparent positions for each day of observation are given, together with the reduction to the mean place for the beginning of the year. As far as we remember, Kasan has the honour of being the second of the observatories engaged on the zone work of the *Astronomische Gesellschaft* which has published their observations, Prof. Krüger having already published his Helsingfors zones (55° to 65° of north declination) in two volumes, the first volume having appeared in 1883, and the second in 1885.

THE MADRAS OBSERVATORY.—Mr. Pogson's report for the year 1884 has recently been issued. He points out that during the year a work on "Telegraphic Longitude Determinations in India" was printed and published. The number of observations made with the meridian circle during the year was 844, which brings up the total number of observations made with this instrument since 1862, now awaiting publication, to 51,722. The separate results and annual catalogues will fill eight volumes, to be followed by a final catalogue of about 5000 stars, reduced to the epoch 1875. All the reductions are completed up to date, and Mr. Pogson hopes that these volumes will appear in fairly rapid succession. We hope so too. The speedy publication of a catalogue of 5000 stars would do much towards restoring the Madras Observatory to the position, as a scientific institution, which it formerly held.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 JUNE 13-19

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on June 13

Sun rises, 3h. 45m.; souths, 11h. 59m. 45·2s.; sets, 20h. 15m.; decl. on meridian, 23° 14′ N.: Sidereal Time at Sunset, 13h. 43m.

Moon (Full on June 16) rises, 16h. 50m.; souths, 21h. 51m.; sets, 2h. 44m.*; decl. on meridian, 13° 26′ S.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury	3 43	12 7	20 31	24 26 N.
Venus	2 0	9 10	16 20	12 52 N.
Mars	11 36	18 1	0 26*	4 7 N.
Jupiter	12 5	18 22	0 39*	2 32 N.
Saturn	5 2	13 13	21 24	22 41 N.

* Indicates that the setting is that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

June	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	° °
18	B.A.C. 6536	6½	2 59	4 7	85 334
19	B.A.C. 7145	6½	21 40	22 18	113 186

Variable Stars

Star	R.A. h. m.	Decl. ° ′			h. m.	
U Cephei	0 52·2	81 16	N.	June 14,	1 55	*m*
				,, 19,	1 35	*m*
R Persei	3 22·8	35 17	N.	,, 18,		*M*
S Cancri	8 37·4	19 17	N.	,, 19,	21 27	*m*
W Virginis	13 20·2	2 47	S.	,, 17,	21 35	*m*
δ Libræ	14 54·9	8 4	S.	,, 13,	0 24	*m*
				,, 19,	23 58	*m*
U Coronæ	15 13·6	32 4	N.	,, 13,	22 59	*m*
U Ophiuchi	17 10·8	1 20	N.	,, 16,	1 28	*m*
				,, 16,	21 35	*m*
X Sagittarii	17 40·4	27 47	S.	,, 19,	2 20	*M*
W Sagittarii	17 57·8	29 35	S.	,, 18,	0 0	*m*
U Sagittarii	18 25·2	19 12	S.	,, 19,	2 25	*m*
β Lyræ	18 45·9	33 14	N.	,, 14,	0 0	*M*
S Vulpeculæ	19 43·7	27 0	N.	,, 15,		*M*
η Aquilæ	19 46·7	0 43	N.	,, 19,	2 30	*M*
R Lacertæ	22 38·2	41 47	N.	,, 16,		*M*

M signifies maximum ; *m* minimum.

BIOLOGICAL NOTES

Development of Ophiopholis and Echinarachnius.—In the last series of studies from the Newport Marine Zoological Laboratory we find a memoir by Mr. Walter Fewkes, on the development of an Ophiuroid (*Ophiopholis aculeata*, Gray) and of an Elypeastroid (*Echinarachnius parma*, Gray). But few observations have been published on the metamorphosis of Ophiopholis, and these often misleading. The eggs would appear to be extruded separately into the water, and the young pass through a metamorphosis in which a pluteus-larva is formed ; the development of this pluteus is different from that of any described Ophiuran, though allied to that in Ophiothrix. The ova were voluntarily shed by the female on August 17 ; they were fertilised outside the body, and appeared to be very hardy. The yolk has a central and a peripheral region, which are distinguishable in the eight-cell and previous stages of segmentation. The cleavage is like that of other Echinoderms. A gastrula is formed by the invagination of the blastoderm, and consequently the stomach of the pluteus is an infolded wall of the blastoderm, and not formed by delamination from the cells in the cavity. The mesoderm-cells originate in two lateral clusters. The oldest pluteus observed was a little more than three days old ; they, however, appeared to be easily raised, and it is to be hoped that they will be yet traced to an adult form. In Echinarachnius the sexes are distinct, and in some cases there were colour-distinctions. In the experiments on the ovum of *E. parma*, artificial fertilisation was resorted to from the middle of July to the end of August ; it was easily effected. In its mode of segmentation it resembles that of other Echinoderms. It has no polar globules, but possibly these may be formed while the egg is in the ovary. As in some other Echinoderms, a gastrula is formed by invagination. The pluteus figured by A. Agassiz in the revision of the Echini as probably that of Echinarachnius proves to belong to this species at about a week old. The development of the young Echinarachnius on the water-tube of the pluteus resembles that of other sea-urchins. The rosette-form of the water-tubes described in other Echinoderms also occurs. The first-formed calcareous deposits of the test are trifid in form, and vary in number in different specimens. The extremity of each trifid division bifurcates later in its growth, and the calcareous body thus formed appears to be inclosed in a transparent wall, which has a spherical outline. Spines are very early formed, and are proportionately very large as compared with those of the adult. The various stages are illustrated in numerous figures on eight, in several cases folding, plates.—*Bull. Mus. Comp. Anat. Harvard College*, vol. xii. No. 4, March 1886.

The Leeches of Japan.—In the April number of the *Quarterly Journal of Microscopical Science*, Dr. C. O. Whitman publishes the first hundred pages of a memoir on the leeches of Japan. The material for the study was collected while the author was connected with the University of Tokio (1879–81). The coloured drawings accompanying the memoir were executed by Mr. Nomura, a young Japanese artist, and they well deserve the remarks of the author: "Mr. Nomura's attention to the minutest details, his infinite patience, trained eye, and his remarkably skilful brush, have given results that are marvels for neatness and accuracy." The first part of this study treats of the land leech (*Hæmadipsa japonica*), the medicinal leech (*Hirudo medicinalis*), and of three species of toothless leeches, which form a new genus, Leptostoma. It also contains a comparison of a few species from Europe, Asia, and America, and a considerable portion is devoted to a comparative study of the different genera, in the endeavour to find a satisfactory basis of classification. This has in a great measure been found in a law of abbreviation of the somites, which, in addition, gives a key to the phylogeny of the genera. The land leech is shown to be a highly instructive and specialised form. The genus Hirudo has been re diagnosed (p. 364), and while internal structure has been dealt with to only a very limited extent, still some interesting facts in connection with the nephridial organs of the land leech are detailed, and the existence of from twelve to fourteen sense-organs on the first ring of each complete somite is demonstrated, and they are homologued with the eyes, having possibly also other sense-functions. The author reserves the genus Hæmadipsa for the land leeches of Ceylon, India, and Japan, with three jaws and five inter-genitalia rings. He ascribes the genus to Tennant, but may it not have been formed by Baird? *H. japonica* is confined to the mountain slopes and ravines, never descending into the plains. It is not only a mountain leech, but it keeps habitually to the ground, living in moss, or under damp leaves and rubbish. They are most voracious, and on the approach of man or beast are at once on the alert. They advance by rapid strides. They bite so gently as scarcely to attract attention, but the wound is deep, and the scar is more or less permanent. They gorge on for about 30 to 40 minutes, and then drop ; while sucking they become bedewed with a transparent liquid, which keeps them moist. If placed in water, they do not swim but sink, and then creep out ; and while having a decided preference for a terrestrial life, can support life for days in water. If into a jar of hungry leeches a puff of breath is blown, they become immensely excited, and it will be difficult to keep them in ; while trying to keep back one, a dozen others will rush out. In a most interesting series of paragraphs Dr. Whitman traces the intimate relation that exists between these land and the medicinal leeches, the latter essentially fresh-water forms. The geographical area of land-leeches is mainly within the tropics, though in Japan they are exposed to a wide range of temperature. *H. nipponia* is described as a new Japanese medicinal leech, well known to the Japanese, and with habits and mode of life just like our European leech. Leptostoma, a new genus, is established (p. 376) on three species of almost edentulous leeches, which, though having a common ancestry with Hirudo, were not derived from it. All three species, *L. acranulatum*, *L. edentulum*, and *L. pigrum*, are from Tokio, and are fully diagnosed and beautifully figured. The segmental organs are shown to be sense-organs, and that from them the eyes have developed, so that they may be regarded as incipient eye spots.

New Element of the Blood and its Relation to Coagulation.—In an important paper by Mr. Geo. T. Kemp on this subject, he comes to the conclusion that in addition to the red corpuscles and leucocytes the blood normally contains a third histological element—the "plaques." These have been variously considered as young red corpuscles ; as nuclei floating in the blood ; as being derived from the red or the white corpuscles ; as being fibrin ; and as being globular depositions produced by cooling of the blood ; but the author proves that, although strong resemblances exist between the plaques and other histological elements of the blood, there is not yet sufficient evidence to establish a *genetic* connection. The plaques should therefore, at least for the present, be regarded as independent elements. When the blood is drawn, the plaques break down almost immediately, and this is not true of any other element of the blood. This breaking down of the plaques seems intimately connected, in its time relations at least, with the clotting of the blood. If a good-sized drop of blood from a finger be let fall on a cover-glass, and as quickly as possible washed by a good jet of ·75 per cent. NaCl solution, and then examined under the